

Example of Method to Randomly Select Two Percent of Surface Area to Test

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NVL Project No. 2012-949
Site Address: Rainer Commons
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Example of Method Using West Side of Building #11

1. Calculate square footage of surface

Example, the west side of building 11 is 70' x 40' = 2,800 Square Feet (SF)

2. Calculate what is 2% of the surface

$$2800 * 0.02 = 56 \text{ SF}$$

3. NVL determined desired minimum number of grid boxes to inspect for the 2% is 5 and the ideal number is 10.

5. NVL determined the ideal size of a grid box is between 4 and 10 SF

6. Calculate the ideal square footage and number for having 10 grid boxes on the surface:

$$56 \text{ SF} / 10 = 5.6 \text{ SF per grid box (this is ideal)}$$

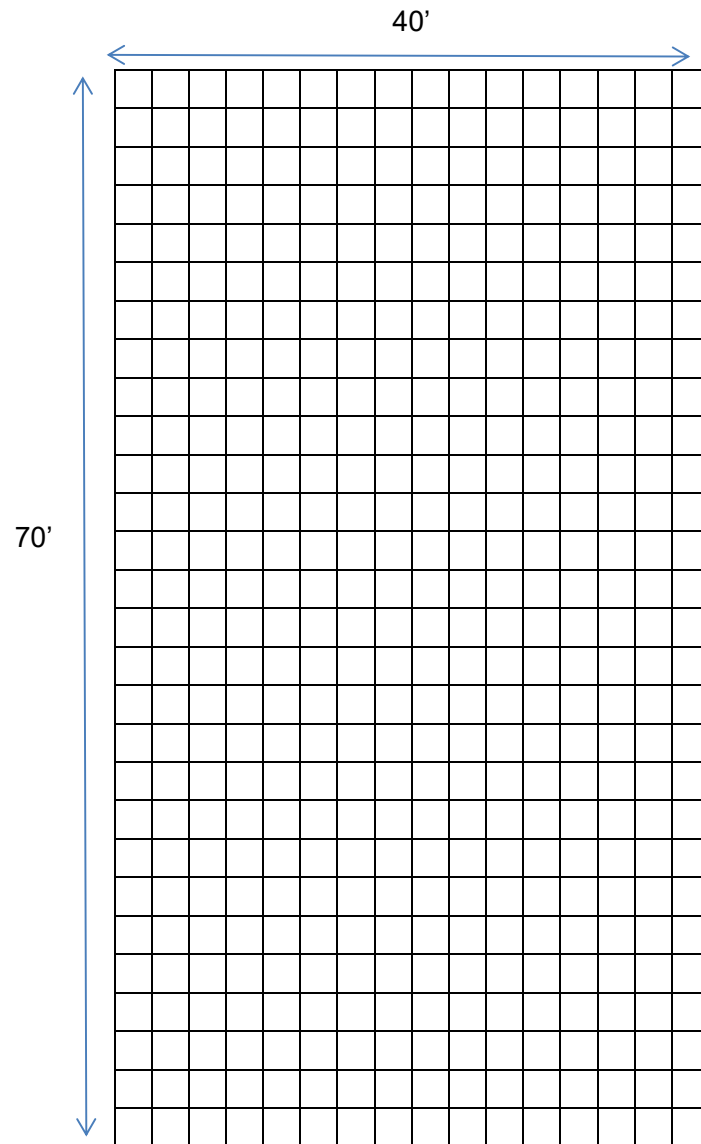
$$2800 \text{ SF} / 5.6 \text{ SF per grid box} = 500 \text{ grid boxes (this is ideal)}$$

7. Figure out how best to define and demark uniform square grid boxes near the ideal number i.e. 500 Grid Boxes on a 70' x 40' surface. (Uniform square to avoid potential statistical skew.)

$70' / 2.5' = 28$ boxes along the 70' side

$40' / 2.5' = 16$ boxes along 40' side.

$28 \times 16 = 448$ Grid Boxes



Which means, each grid box = $2.5' \times 2.5' = 6.25$ SF

As calculated earlier, assess at least two percent 2 percent of the side of the building, 56 SF must tested. $56 \text{ SF} / (6.25 \text{ SF/box}) = 8.96$ boxes, which means **9 grid boxes minimally need to be inspected**

8. Create the grid. The numbers for the grid boxes will be set up in a boustrophedon pattern, i.e. alternate lines in opposite directions for the purpose to avoiding potential statistical skew.

The selection of the random grid boxes is done in the next step, and those that are selected in the next step are indicated on the grid. For this example, the first 9 randomly selected grid box numbers are in **RED**.

The following page has a 28 x 16 grid, with 448 grid boxes numbered in a boustrophedon pattern.

← 40' →

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
32	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17
33	☺														48
64														☺	49
65	☺												78		80
96														☺	81
97	☺														112
128														☺	113
129	☺											141			144
160							153							☺	145
161	☺	163					168								176
192														☺	177
193	☺														208
224	223													☺	209
225	☺														240
256														☺	241
257	☺														272
288														☺	273
289	☺														304
320								312	311					☺	305
321	☺										332				336
352							344							☺	337
353	☺														368
384														☺	369
385	☺														400
416														☺	401
417	☺	419										429			432
448		446											435	☺	433

70' ↑

9. Determine / identify grid on actual surface

The surface grid will typically be marked off on the actual surface using a tape measure and chalked line.

For this example, Building #11 is being used. The following is a picture of the west side of Building #11 as well as a diagram of the west side of the building with the inspection grid overlaid.

Building #11:



Inspection Grid Overlay:

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
32	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17
33	↻														48
64														⊙	49
65	↻														80
96														⊙	81
97	↻													⊙	112
128														⊙	113
129	↻														144
160														⊙	145
161	↻	163						168							176
192														⊙	177
193	↻														208
224	223													⊙	209
225	↻														240
256														⊙	241
257	↻														272
288														⊙	273
289	↻														304
320														⊙	305
321	↻														336
352														⊙	337
353	↻														368
384														⊙	369
385	↻														400
416														⊙	401
417	↻	419											429		432
448		446											435	⊙	433

One potential issue, as can be seen in the grid overlay above, is that some cells lie within the windows or other areas that might not have paint.

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10. Select the grid boxes to be inspected using random numbers

Number of grid boxes = 448

Number of random grid boxes needed = 9

Use a random number generator to generate a list of unique three-digit random numbers that fall within the range of cell numbers (in this case, numbers 1-448). Generally, the number of random three digit numbers on the list should be two times the number of random grid boxes needed. For this experiment, 18 random unique three-digit numbers in the chosen range were created using the random number generator:

141
004
099
312
435
429
332
153
334
023
419
199
423
211
068
183
350
091

Working down this list of random numbers, the first random number that corresponds with an available grid box on the building side will be marked as the first inspection location. The next number on the list that corresponds with an available grid box will be the second inspection location, and so forth. A numbered inspection box becomes unavailable if the inspection box is located on an unpainted surface.

In this situation, the numbers 099 and 334 were unavailable and not utilized as inspection locations because the corresponding cells are non-painted surfaces (windows).

Here is an example of nine randomly selected inspection locations that resulted from our mock selection:

Location #	Grid Box Random Number
1	141
2	004
3	312
4	435
5	429
6	332
7	153
8	023
9	419

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11. Extra Visual Inspection Testing – NVL Selected Worse Case

In addition, at least two grid boxes will be selected in a non-random fashion by NVL as “worse case” inspection locations. These two grid boxes will be identified by NVL personnel on-site based on the visual characteristics of the wall and substrate. These two inspection locations will be assessed in the same fashion as all other grid boxes.